

ABSTRACT

A rugged, all-electronic fluid dispensing system for use with pipettes or in other contexts indirectly measures fluid flow by using a non-linear system model to correlate vacuum existing at the top of a column of suspended fluid. Non-contact operation is provided to eliminate the need for contact-type closed-loop fluid flow sensing and associated potential cross-contamination risks. In one particular exemplary non-limiting illustrative implementation, an electronic controller within a gun-shaped, cordless self-contained pipetter housing dynamically calculates valve opening time based on a non-linear equation. Calibration is used to derive equation constants, and column vacuum pressure before the valve is opened is used as the independent variable to derive a valve opening time that will result in accurate dispensing of a desired programmed fluid quantity. Repetitive automatic dispensing with accuracies greater than 1% are possible within the context of a relatively inexpensive portable pipette or device without the need for mechanically-complex positive displacement arrangements.